

**Citation:**

Al-Zahrani MS. Increased intake of dairy products is related to lower periodontitis prevalence. *J Periodontol*. 2006; 77 (2): 289-294.

**PubMed ID:** [16460256](#)

**Study Design:**

Cross-sectional study

**Class:**

D - [Click here](#) for explanation of classification scheme.

**Research Design and Implementation Rating:**

POSITIVE: See Research Design and Implementation Criteria Checklist below.

**Research Purpose:**

To examine whether or not there was an association between the intake of dairy products and periodontitis prevalence using NHANES III data.

**Inclusion Criteria:**

- NHANES III data
- 18 years of age or older
- Periodontal examination.

**Exclusion Criteria:**

- Persons who were classified under the race/ethnicity category as "others" were excluded due to small size (N=575)
- Pregnant or nursing women (N=326).

**Description of Study Protocol:****Recruitment**

NHANES III data.

**Design**

Cross-sectional.

**Dietary Intake/Dietary Assessment Methodology**

- Twenty-four-hour dietary recall was administered during household interviews by trained interviewers

- Participants were asked to report their intake of food and beverages (except for plain drinking water) for the past 24 hours
- The number of servings of dairy products was then calculated by the National Center for Health Statistics from various milk and milk products.

### Statistical Analysis

- Intake was divided into quintiles
- Characteristics of study participants were examined across intake of dairy products categories
- Univariable and multivariable logistic regression analyses were used to estimate the association between intake of dairy products categories and periodontitis prevalence
- In the multivariable model, all selected explanatory variables were kept in the model regardless of their significance level or their effect on the estimate of the association
- To test for a significant linear trend, median quintile values were calculated and entered into the regression model as a continuous variable.

### Data Collection Summary:

#### Dependent Variables

- Periodontitis: Examination on one mandibular and one maxillary quadrant, randomly assigned. Probing depth and clinical recession was recorded on the mid- and mesio-facial surfaces of all teeth, excluding third molars and remaining roots
- Periodontitis was defined as the presence of one or more sites with an attachment loss 3mm or more and a probing depth of 4mm or more.

#### Independent Variables

Intake of dairy products in quintiles.

#### Control Variables

- Age
- Gender
- Race/ethnicity
- Education attainment
- Poverty index
- Cigarette-smoking status
- History of diabetes
- Vitamin and mineral supplement use
- Physical activity
- Body mass index (BMI)
- Percentage of sites with gingival bleeding
- Percentage of sites with dental calculus deposit
- Time elapsed since last dental visit.

### Description of Actual Data Sample:

- *Initial N*: 13,665
- *Attrition (final N)*: 12,764 (6,549 females, 6,215 males)

- *Age*: Mean age of individuals with periodontitis (47.5±0.68 years) was higher than those without periodontitis (40.2±0.68 years, P<0.001)
- *Ethnicity*: Non-Hispanic whites, non-Hispanic blacks, Mexican Americans
- *Other relevant demographics*: Prevalence of periodontitis was higher among smokers than former or never-smokers and was also higher for males than females and for non-Hispanic blacks than Mexican Americans and non-Hispanic whites
- *Location*: United States.

## Summary of Results:

- Mean and median intake of dairy products for the study was 2.1 and 1.6 servings per day, respectively
- Mean intake was higher for males than females
- Mean intake was higher for non-Hispanic whites than Mexican and African Americans
- Individuals with higher education level had a higher intake of dairy products than those with a lower education level
- Mean intake of dairy products decreased with decreasing level of physical activity
- Individuals with periodontitis had a lower mean intake than those without periodontitis
- Individuals in the highest quintile of dairy intake were 41% less likely to have periodontitis than those in the lowest quintile (P<0.001).

Study characteristics by quintile of dairy product intake by quintile [median intake (servings per day)]:

- Subjects in the fifth quintile were significantly younger than subjects in the first quintile
- Subjects in the fifth quintile had a higher mean poverty index than subjects in the first quintile
- Subjects in the fifth quintile had a significantly lower BMI than those in the first quintile
- Subjects in the fifth quintile had significantly lower percentage of sites with calculus deposits than those in the first quintile
- Subjects in the fifth quintile had significantly less periodontitis than those in the first quintile.

	1 (0.2)	2 (0.9)	3 (1.6)	4 (2.6)	5 (4.7)	P-value *
<b>Age (mean [SE])</b>	42.1 (0.56)	43.1 (0.74)	41.4 (0.56)	41.0 (0.67)	38.2 (0.55)	<0.01
<b>Poverty index (mean [SE])</b>	2.2 (0.03)	2.4 (0.03)	2.4 (0.03)	2.4 (0.03)	2.4 (0.3)	<0.01
<b>BMI in kg/m<sup>2</sup> (mean [SE])</b>	26.8 (0.16)	26.5 (0.18)	26.3 (0.19)	26.4 (0.22)	26.1 (0.24)	0.02
<b>Bleeding (mean [SE]): percentage of sites with gingival bleeding upon probing</b>	9.9 (0.63)	9.4 (0.71)	8.9 (0.75)	9.2 (0.69)	9.0 (0.82)	0.19

<b>Calculus (mean [SE]):</b>						
<b>Percentage of sites with calculus deposits</b>	42.1 (1.6)	37.4 (1.7)	33.0 (1.5)	33.6 (1.4)	34.7 (1.8)	<0.01
<b>Periodontitis (Percentage [SE])</b>	17.8 (1.3)	16.1 (1.6)	13.6 (1.3)	11.4 (1.4)	11.2 (1.1)	<0.01

\* P-value for the mean difference of the first and fifth quintiles.

#### **Odds Ratios (95% CI) of periodontitis by quintiles of dairy intake.\***

	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>P-value for Trend</b>
<b>Unadjusted</b>	0.89 (0.73-1.09)	0.73 (0.59-0.90)	0.59 (0.47-0.74)	0.59 (0.47-0.74)	0.000
<b>Adjusted</b>					
<b>Model 1</b>	0.86 (0.70-1.05)	0.73 (0.59-0.90)	0.60 (0.47-0.77)	0.64 (0.51-0.82)	0.000
<b>Model 2</b>	0.88 (0.71-1.07)	0.75 (0.61-0.93)	0.62 (0.48-0.79)	0.65 (0.51-0.84)	0.000
<b>Model 3</b>	1.03 (0.81-1.3)	0.91 (0.74-1.12)	0.75 (0.57-0.99)	0.79 (0.59-1.05)	0.022
<b>Final</b>	1.07 (0.83-1.37)	0.98 (0.79-1.2)	0.78 (0.60-1.03)	0.80 (0.61-1.07)	0.024

\* First quintile is the reference category.

Model 1 is adjusted for age only; model 2 is adjusted for age and smoking; model 3 is adjusted for age, gender, race/ethnicity, smoking, education, diabetes, poverty index, vitamin use, BMI, physical activity, time since the last dental visit, and gingival bleeding; the final model is adjusted for dental calculus in addition to all previous variables.

For the Final: N=11,162, sample size differs because some of the covariates had missing data.

#### **Author Conclusion:**

- There was an inverse association between intake of dairy products and prevalence of periodontitis
- Individuals who were in the highest quintile of intake of dairy products were 20% less likely to have periodontitis than individuals in the lowest quintile independent of major risk factors for periodontitis
- The association remained moderately strong and significant even after controlling for major risk factors for periodontitis.

## Reviewer Comments:

*The following limitations were noted by the authors:*

- *The inability to indicate the level of the intake of dairy products prior to the onset of periodontitis*
- *Twenty-four-hour dietary recall may not reflect an individual's long-term dietary intake*
- *NHANES data has no information on brushing and flossing habits or plaque levels.*

## Research Design and Implementation Criteria Checklist: Primary Research

### Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

### Validity Questions

1.	<b>Was the research question clearly stated?</b>	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	<b>Was the selection of study subjects/patients free from bias?</b>	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	???

<b>3.</b>	<b>Were study groups comparable?</b>	<b>Yes</b>
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	No
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
<b>4.</b>	<b>Was method of handling withdrawals described?</b>	<b>Yes</b>
4.1.	Were follow-up methods described and the same for all groups?	N/A
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	???
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
<b>5.</b>	<b>Was blinding used to prevent introduction of bias?</b>	<b>No</b>
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	No
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	No
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A

5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
<b>6.</b>	<b>Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening factors described?</b>	<b>Yes</b>
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	???
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	Yes
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	Yes
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
<b>7.</b>	<b>Were outcomes clearly defined and the measurements valid and reliable?</b>	<b>Yes</b>
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	N/A
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
<b>8.</b>	<b>Was the statistical analysis appropriate for the study design and type of outcome indicators?</b>	<b>Yes</b>
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes

8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	No
9.	<b>Are conclusions supported by results with biases and limitations taken into consideration?</b>	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	<b>Is bias due to study's funding or sponsorship unlikely?</b>	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes